Math 442 / Differential Geometry of Curves and Surfaces / David Dumas

Extra problems from lecture 5 (September 1, 2010)

(Lec5 P1) Let $\alpha : \mathbb{R} \to \mathbb{R}^3$ be a regular curve parameterized by arc length and define $\bar{\alpha}(s) = \alpha(-s)$. Assume that α does not have any inflection points.

(a) Show that $\bar{\alpha}$ is a regular curve parameterized by arc length.

(b) Express the Frenet frame of $\bar{\alpha}$ in terms of the Frenet frame of α. (That is, how are $(\bar{t}, \bar{n}, \bar{b})$ related to (t, n, b)?)

(c) Express the curvature and torsion of $\bar{\alpha}$ in terms of those of α.

(Lec5 P2) Let $\alpha(t) = (t, t^2, t^3)$. Calculate the Frenet frame, curvature and torsion of α at $t = 0$.